General

Guideline Title

American Academy of Orthopaedic Surgeons clinical practice guideline on management of hip fractures in the elderly.

Bibliographic Source(s)

American Academy of Orthopaedic Surgeons (AAOS). American Academy of Orthopaedic Surgeons clinical practice guideline on management of hip fractures in the elderly. Rosemont (IL): American Academy of Orthopaedic Surgeons (AAOS); 2014 Sep 5. 521 p. [186 references]

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Definitions of the strength of recommendations (Strong, Moderate, Limited, and Consensus) and Strength Visual (****, ***, **, *) are provided at the end of the "Major Recommendations" field.

Note from the American Academy of Orthopaedic Surgeons (AAOS): The following is a summary of the recommendations of the AAOS Clinical Practice Guideline on the Management of Hip Fractures in the Elderly. All readers of this summary are strongly urged to consult the full guideline and evidence report for this information. The AAOS work group is confident that those who read the full guideline and evidence report will see that the recommendations were developed using systematic evidence-based processes designed to combat bias, enhance transparency, and promote reproducibility.

This summary of recommendations is not intended to stand alone. Treatment decisions should be made in light of all circumstances presented by the patient. Treatments and procedures applicable to the individual patient rely on mutual communication between patient, physician, and other healthcare practitioners.

Advanced Imaging

Moderate evidence supports magnetic resonance imaging (MRI) as the advanced imaging of choice for diagnosis of presumed hip fracture not apparent on initial radiographs. Strength of Recommendation: Moderate ***

Preoperative Regional Analgesia

Strong evidence supports regional analgesia to improve preoperative pain control in patients with hip fracture. Strength of Recommendation:

Strong ****

Preoperative Traction

Moderate evidence does not support routine use of preoperative traction for patients with a hip fracture. Strength of Recommendation: Moderate ***

Surgical Timing

Moderate evidence supports that hip fracture surgery within 48 hours of admission is associated with better outcomes. Strength of Recommendation: Moderate ***

Aspirin and Clopidogrel

Limited evidence supports not delaying hip fracture surgery for patients on aspirin and/or clopidogrel. Strength of Recommendation: Limited **

Anesthesia

Strong evidence supports similar outcomes for general or spinal anesthesia for patients undergoing hip fracture surgery. Strength of Recommendation: Strong ****

Stable Femoral Neck Fractures

Moderate evidence supports operative fixation for patients with stable (non-displaced) femoral neck fractures. Strength of Recommendation: Moderate ***

Displaced Femoral Neck Fractures

Strong evidence supports arthroplasty for patients with unstable (displaced) femoral neck fractures. Strength of Recommendation: Strong ****

Unipolar Versus Bipolar

Moderate evidence supports that the outcomes of unipolar and bipolar hemiarthroplasty for unstable (displaced) femoral neck fractures are similar. Strength of Recommendation: Moderate ***

Hemi VS. Total Hip Arthroplasty

Moderate evidence supports a benefit to total hip arthroplasty in properly selected patients with unstable (displaced) femoral neck fractures. Strength of Recommendation: Moderate ***

Cemented Femoral Stems

Moderate evidence supports the preferential use of cemented femoral stems in patients undergoing arthroplasty for femoral neck fractures. Strength of Recommendation: Moderate ***

Surgical Approach

Moderate evidence supports higher dislocation rates with a posterior approach in the treatment of displaced femoral neck fractures with hip arthroplasty. Strength of Recommendation: Moderate ***

Stable Intertrochanteric Fractures

Moderate evidence supports the use of either a sliding hip screw or a cephalomedullary device in patients with stable intertrochanteric fractures. Strength of Recommendation: Moderate ***

Subtrochanteric or Reverse Oblique Fractures

Strong evidence supports using a cephalomedullary device for the treatment of patients with subtrochanteric or reverse obliquity fractures. Strength of Recommendation: Strong ****

Unstable Intertrochanteric Fractures

Moderate evidence supports using a cephalomedullary device for the treatment of patients with unstable intertrochanteric fractures. Strength of Recommendation: Moderate ***

Venous Thromboembolism (VTE) Prophylaxis

Moderate evidence supports use of VTE prophylaxis in hip fracture patients. Strength of Recommendation: Moderate ***

Transfusion Threshold

Strong evidence supports a blood transfusion threshold of no higher than 8 g/dl in asymptomatic postoperative hip fracture patients. Strength of Recommendation: Strong ****

Occupational and Physical Therapy

Moderate evidence supports that supervised occupational and physical therapy across the continuum of care, including home, improves functional outcomes and fall prevention. Strength of Recommendation: Moderate ***

Intensive Physical Therapy

Strong evidence supports intensive physical therapy post-discharge to improve functional outcomes in hip fracture patients. Strength of Recommendation: Strong ****

Nutrition

Moderate evidence supports that postoperative nutritional supplementation reduces mortality and improves nutritional status in hip fracture patients. Strength of Recommendation: Moderate ***

Interdisciplinary Care Program

Strong evidence supports use of an interdisciplinary care program in those patients with mild to moderate dementia who have sustained a hip fracture to improve functional outcomes. Strength of Recommendation: Strong ****

Postoperative Multimodal Analgesia

Strong evidence supports multimodal pain management after hip fracture surgery. Strength of Recommendation: Strong ****

Calcium and Vitamin D

Moderate evidence supports use of supplemental vitamin D and calcium in patients following hip fracture surgery. Strength of Recommendation: Moderate ***

Screening

Limited evidence supports preoperative assessment of serum levels of albumin and creatinine for risk assessment of hip fracture patients. Strength of Recommendation: Limited **

Osteoporosis Evaluation and Treatment

Moderate evidence supports that patients be evaluated and treated for osteoporosis after sustaining a hip fracture. Strength of Recommendation: Moderate ***

Definitions:

Strength of Recommendations Descriptions

Strength	Overall Strength of Evidence	Description of Evidence Strength	Strength Visual
Strong	Strong	Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.	****
Moderate	Moderate	Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.	***
Limited	Low Strength Evidence or Conflicting	Evidence from one or more "Low" strength studies with consistent findings or evidence from a single "Moderate" strength study for recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the	**

Strength Consensus†	Overall Strength of Evidence	Description of Evidence Strength	Strength Visual
	No Evidence	intervention. There is no supporting evidence. In the absence of reliable evidence, the work group is making a recommendation based on their clinical opinion. Consensus recommendations can only be created when not establishing a recommendation could have catastrophic consequences.	

†Consensus based recommendations are made according to specific criteria. These criteria can be found in Appendix VI in the original guideline document.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Hip fracture

Guideline Category

Diagnosis

Evaluation

Management

Rehabilitation

Risk Assessment

Treatment

Clinical Specialty

Anesthesiology

Critical Care

Emergency Medicine

Family Practice

Geriatrics

Orthopedic Surgery

Radiology

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Health Plans

Hospitals

Nurses

Occupational Therapists

Patients

Physical Therapists

Physician Assistants

Physicians

Public Health Departments

Guideline Objective(s)

- To provide practice recommendations on the management of hip fractures in patients over the age of 65 based on a systematic review of published studies
- To highlight limitations in the literature and areas that require future research
- To serve as an information resource for decision makers and developers of practice guidelines and recommendations
- To help improve treatment based on the current best evidence

Target Population

Elderly patients (65 years of age or older) with low energy hip fractures

Note: The guideline is not intended to address management of patients with fractures as a result of high energy trauma or those with fractures related to pathologic bone lesions.

Interventions and Practices Considered

1. Advanced imaging (magnetic resonance imaging [MRI]) for diagnosis of presumed hip fracture
2. Preoperative regional analgesia
3. Preoperative traction (not recommended routinely)
4. Surgical timing (within 48 hours)
5. Not delaying hip fracture surgery for patients on aspirin and/or clopidogrel
6. General or spinal anesthesia
7. Operative fixation for stable femoral neck fractures
8. Arthroplasty for displaced femoral neck fractures
9. Unipolar vs. bipolar hemiarthroplasty for unstable (displaced) femoral neck fractures
10. Hemi vs. total hip arthroplasty for unstable (displaced) femoral neck fractures
11. Cemented femoral stems
12. Surgical approach (posterior)
13. Sliding hip screw or a cephalomedullary device (stable intertrochanteric fractures)
14. Cephalomedullary device (subtrochanteric or reverse obliquity fractures or unstable intertrochanteric fractures)
15. Venous thromboembolism (VTE) prophylaxis
16. Blood transfusion (threshold of not higher than 8 g/dl)
17. Occupational and physical therapy across the continuum of care
18. Intensive physical therapy post-discharge
19. Postoperative nutritional supplementation
20. Interdisciplinary care program in patients with dementia
21. Postoperative multimodal analgesia
22. Supplemental calcium and vitamin D

23. Preoperative assessment of serum levels of albumin and creatinine
24. Osteoporosis evaluation and treatment

Major Outcomes Considered

- Sensitivity and specificity of imaging studies for diagnosis of hip fracture
- Pain relief (as measured by visual analog scale [VAS] or other pain scale)
- Hospital length of stay
- Mortality
- Intraoperative or postoperative complications
- Functional status
- Readmission
- Need for red blood cell transfusion
- Major bleeding
- Functional recovery scores
- Ambulation ability
- Quality of life
- Need for revision
- Deep vein thrombosis or pulmonary embolism

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Study Selection Criteria

The American Academy of Orthopaedic Surgeons (AAOS) work group developed *a priori* article inclusion criteria for the review. These criteria are the "rules of evidence" and articles that did not meet them are, for the purposes of this guideline, not evidence.

To be included in the systematic reviews (and hence, in this guideline) an article had to meet the following criteria:

- Study must be of elderly (mean age of 65) patients with hip fractures.
- Article must be a full article report of a clinical study.
- Retrospective non-comparative case series, medical records review, meeting abstracts, historical articles, editorials, letters, and commentaries are excluded.
- Case series studies that give patients the treatment of interest AND another treatment are excluded.
- Case series studies that have non-consecutive enrollment of patients are excluded.
- Controlled trials in which patients were not stochastically assigned to groups AND in which there was either a difference in patient characteristics or outcomes at baseline AND where the authors did not statistically adjust for these differences when analyzing the results are excluded.
- All studies evaluated as Level V will be excluded.
- Composite measures or outcomes are excluded even if they are patient-oriented.
- Study must appear in a peer-reviewed publication.
- Study should have 10 or more patients per group.
- Study must be of humans.

- Study must be published in English.
- Study must be published in or after 1966.
- Study results must be quantitatively presented.
- All study follow up durations are included.
- For any given follow-up time point in any included study, there must be ≥50% patient follow-up (if the follow-up is >50% but <80%, the study quality will be downgraded by one level).
- For any included study that uses "paper-and-pencil" outcome measures (e.g., SF-36), only those outcome measures that have been validated will be included.
- Study must not be an in vitro study.
- Study must not be a biomechanical study.
- Study must not have been performed on cadavers.

The work group will only evaluate surrogate outcomes when no patient oriented outcomes are available.

The work group did not include systematic reviews or meta-analyses compiled by others or guidelines developed by other organizations. These documents are developed using different inclusion criteria than those specified by the AAOS work group. Therefore they may include studies that do not meet the inclusion criteria. These documents were recalled, if the abstract suggested they might provide an answer to one of the recommendations, and bibliographies were searched for additional studies to supplement the systematic review.

Literature Searches

The work group began the systematic review with a comprehensive search of the literature. Articles considered were published prior to May 2012 in four electronic databases: PubMed, EMBASE, CINAHL, and The Cochrane Central Register of Controlled Trials. The medical librarian conducts the search using key terms determined from the work group's preliminary recommendations.

The work group supplemented the electronic search with a manual search of the bibliographies of all retrieved publications, recent systematic reviews, and other review articles for potentially relevant citations. Recalled articles are evaluated for possible inclusion based on the study selection criteria and are summarized for the work group who assist with reconciling possible errors and omissions.

The study attrition diagram in Appendix IV in the original guideline document provides a detailed description of the numbers of identified abstracts and recalled and selected studies that were evaluated in the systematic review of this guideline. The search strategies used to identify the abstracts are contained in Appendix V in the original guideline document.

Number of Source Documents

146 articles were included after full text review and quality analysis.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Methods for Evaluating Evidence

Studies of Intervention/Prevention

Quality

The American Academy of Orthopaedic Surgeons (AAOS) judges quality based on *a priori* research questions and uses an automated numerical scoring process to arrive at final ratings. Extensive measures are taken to determine quality ratings so that they are free of bias.

The quality of evidence is evaluated separately for each outcome reported in every study using research design domains suggested by Grading of Recommendations Assessment, Development and Evaluation (GRADE) work group members and others. The GRADE evidence appraisal system is used in the Cochrane Collaboration and has been developed for studies evaluating matched control groups. A coding scheme adaptable to all research designs is incorporated that involves incremental increases or decreases based on the following criteria:

- The study was prospective (with prospective studies, it is possible to have an *a priori* hypothesis to test; this is not possible with retrospective studies)
- The statistical power of the study
- The assignment of patients to groups was unbiased
- There was sufficient blinding to mitigate against a placebo effect
- The patient groups were comparable at the beginning of the study
- The treatment was delivered in such a way that any observed effects could reasonably be attributed to that treatment
- Whether the instruments used to measure outcomes were valid
- Whether there was evidence of investigator bias

Each of the above quality domains is rated for possible flaws based on up to four indicator questions that define them. See Appendix V in the original guideline document for a discussion of the AAOS appraisal system. Domains are considered "flawed" if one indicator is coded "No" or at least two defining questions are "Unclear." The Statistical Power domain is considered flawed if sample size is too small to detect at least a small effect size of 0.2.

If there are flawed domains then the evidence quality is downgraded according to the reductions shown in the table below. As an example, the evidence reported in a randomized controlled trial (RCT) for any given outcome is rated as "High" quality if zero or one domain is flawed. If two or three domains are flawed, the rating is reduced to "Moderate." If four or five domains are flawed, the quality of evidence is downgraded to "Low." The quality of evidence is reduced to "Very Low" if six or more domains are flawed. As indicated above, very low quality evidence is not included in this AAOS guideline.

Relationship between Quality and Domain Scores for Interventions

Number of Domains with No More Than One "Unclear" Answer	**Strength of Evidence**
0	High
1-2	Moderate
3-4	Low
>5	Very low

Some flaws are so serious that the evidence is automatically termed as being of "Very Low" quality if a study exhibits them. These serious design flaws are:

- Non-consecutive enrollment of patients in a case series
- Case series that gave patients the treatment of interest AND another treatment
- Measuring the outcome of interest one way in some patients and measuring it in another way in other patients
- Low statistical power

Conversely, the quality of research articles may be upgraded if the research is of high applicability or if providing the intervention decreases the potential for catastrophic harm, such as loss of life or limb. The criteria, based on the GRADE methodology, which can be used to upgrade the quality of a study, are as follows:

- The study has a large (>2) or very large (>5) magnitude of treatment effect: used for non-retrospective observational studies;
- All plausible confounding factors would reduce a demonstrated effect or suggest a spurious effect when results show no effect;
- Consideration of the dose-response effect.

Quality is one of two dimensions that determine the strength of the final recommendations.

Applicability

The applicability (also called "generalizability" or "external validity") of an outcome is one of the factors used to determine the strength of a recommendation. Outcomes are categorized according to whether their applicability is "High", "Moderate", or "Low." As with quality, the applicability for each outcome a study reports is separately evaluated.

The applicability of a study is evaluated using the pragmatic-explanatory continuum indicator summary (PRECIS) instrument. The instrument was originally designed to evaluate the applicability of randomized controlled trials, but it can also be used for studies of other design. For example, the existence of an implicit control group in a case series (see above) make it useful for evaluating outcomes from these latter studies.

This instrument is comprised of the 10 questions that are briefly described in Table 2 in the original guideline document. All 10 questions are asked of all studies, regardless of design. The questions are divided into four domains. These domains and their corresponding questions are given in Table 2 in the original guideline document.

Each study is assumed to have "High" applicability at the start, and applicability is downgraded for flawed domains as summarized in the table below.

Relationship between Applicability and Domain Scores for Studies of Treatments

Number of Flawed Domains	**Applicability**
0	High
1,2,3	Moderate
4	Low

A study's applicability is "High" if there is only one "Unclear" answer in one domain and the answers to all of the questions for all other domains is "Yes." A study's applicability is low if there is one "Unclear" answer in one domain and the answers to all of the questions for all other domains is "No." A study's applicability is "Moderate" under all other conditions.

Refer to Section III in the original guideline document for a description of the methods used to determine the quality and applicability of evidence for the following types of studies:

- Studies of screening and diagnostic tests
- Studies of prognostics

Final Strength of Evidence

To determine the final strength of evidence for an outcome, the strength is initially taken to equal quality. An outcome's strength of evidence is increased by one category if its applicability is "High", and an outcome's strength of evidence is decreased by one category if its applicability is "Low." If an outcome's applicability is "Moderate", no adjustment is made to the strength of evidence derived from the quality evaluation.

Methods Used to Analyze the Evidence

Meta-Analysis

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Best Evidence Synthesis

Only the best available evidence for any given outcome addressing a recommendation was included. Accordingly, the American Academy of Orthopaedic Surgeons (AAOS) work group first included the highest quality evidence for any given outcome if it was available. In the absence of two or more occurrences of an outcome at this quality, the work group considered outcomes of the next lowest quality until at least two or more occurrences of an outcome had been acquired. For example, if there were two "moderate" quality occurrences of an outcome that addressed a recommendation, the work group did not include "low" quality occurrences of this outcome. A summary of the evidence that met the inclusion criteria, but was not best available evidence was created and can be viewed by recommendation in Appendix XII in the original guideline document.

Statistical Methods

Analysis of Diagnostic Data

Likelihood ratios (LR), sensitivity, specificity and 95% confidence intervals were calculated to determine the accuracy of diagnostic modalities based on two by two diagnostic contingency tables extracted from the included studies. When summary values of sensitivity, specificity, or other diagnostic performance measures were reported, estimates of the diagnostic contingency table were used to calculate LR.

LR indicate the magnitude of the change in probability of disease due to a given test result. For example, a positive LR of 10 indicates that a positive test result is 10 times more common in patients with disease than in patients without disease. LR are interpreted according to previously published values, as seen in Table 11 in the original guideline document.

Analysis of Intervention/Prevention Data

When possible, the results reported in individual studies are recalculated and compiled to answer the recommendations. The results of all statistical analysis conducted by the AAOS Clinical Practice Guidelines Unit are conducted using STATA 12. STATA was used to determine the magnitude, direction, and/or 95% confidence intervals of the treatment effect. For data reported as means (and associated measures of dispersion) the mean difference between groups and the 95% confidence interval was calculated and a two-tailed t-test of independent groups was used to determine statistical significance. When published studies report measures of dispersion other than the standard deviation the value was estimated to facilitate calculation of the treatment effect. In studies that report standard errors or confidence intervals the standard deviation was back-calculated. In some circumstances statistical testing was conducted by the authors and measures of dispersion were not reported. In the absence of measures of dispersion, the results of the statistical analyses conducted by the authors (i.e., the p-value) are considered as evidence. For proportions, the proportion of patients that experienced an outcome along with the percentage of patients that experienced an outcome is reported. The variance of the arcsine difference was used to determine statistical significance. P-values <0.05 were considered statistically significant.

Meta-analyses were performed using the random effects method of DerSimonian and Laird. A minimum of four studies was required for an outcome to be considered by meta-analysis. Heterogeneity was assessed with the I-squared statistic. Meta-analyses with I-squared values less than 50% were considered as evidence. Those with I-squared larger than 50% were not considered as evidence for this guideline. All meta-analyses were performed using STATA 12 and the "metan" command. The arcsine difference was used in meta-analysis of proportions. In order to overcome the difficulty of interpreting the magnitude of the arcsine difference, a summary odds ratio is calculated based on random effects meta-analysis of proportions and the number needed to treat (or harm) is calculated. The standardized mean difference was used for meta-analysis of means and magnitude was interpreted using Cohen's definitions of small, medium, and large effect.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

This guideline and systematic review were prepared by the American Academy of Orthopaedic Surgeons (AAOS) Management of Hip Fractures in the Elderly guideline physician work group (clinical experts) with the assistance of the AAOS Evidence-Based Medicine (EBM) Unit in the Department of Research and Scientific Affairs (methodologists) at the AAOS. To develop this guideline, the work group held an introductory meeting on June 11-12, 2011 to establish the scope of the guideline and the systematic reviews. The physician experts defined the scope of the guideline by creating preliminary recommendations (Questions) that directed the literature search. When necessary, these clinical experts also provided content help, search terms and additional clarification for the AAOS Medical Librarian. The Medical Librarian created and executed the search(s). The supporting group of methodologists (AAOS EBM Unit) reviewed all abstracts, recalled pertinent full-text articles for review and evaluated the quality of studies meeting the inclusion criteria. They also abstracted, analyzed, interpreted, and/or summarized the relevant evidence for each recommendation and prepared the initial draft for the final meeting. Upon completion of the systematic reviews, the physician work group participated in a three-day recommendation meeting on October 25-26, 2013. At this meeting, the physician experts and methodologists then evaluated and integrated all material to develop the final recommendations. The final recommendations and rationales were edited, written and voted on at the final meeting. The draft guideline recommendations and rationales received final review by the methodologists to ensure that these recommendations and rationales were consistent with the data. The draft was then completed and submitted for peer review on April 1, 2014.

Formulating Preliminary Recommendations

The work group began work on this guideline by constructing a set of preliminary recommendations. These recommendations specify [what] should be done in [whom], [when], [where], and [how often or how long]. They function as questions for the systematic review, not as final recommendations or conclusions. Preliminary recommendations are almost always modified on the basis of the results of the systematic review. Once established, these a priori preliminary recommendations cannot be modified until the final work group meeting.

Defining the Strength of the Recommendations

Judging the strength of evidence is only a stepping stone towards arriving at the strength of a guideline recommendation. The strength of recommendation also takes into account the quality, quantity, and the trade-off between the benefits and harms of a treatment, the magnitude of a

treatment's effect, and whether there is data on critical outcomes.

Strength of recommendation expresses the degree of confidence one can have in a recommendation. As such, the strength expresses how possible it is that a recommendation will be overturned by future evidence. It is very difficult for future evidence to overturn a recommendation that is based on many high quality randomized controlled trials that show a large effect. It is much more likely that future evidence will overturn recommendations derived from a few small case series. Consequently, recommendations based on the former kind of evidence are given a high strength of recommendation and recommendations based on the latter kind of evidence are given a low strength.

To develop the strength of a recommendation, AAOS staff first assigned a preliminary strength for each recommendation that took only the final strength of evidence (including quality and applicability) and the quantity of evidence (see the "Rating Scheme for the Strength of the Recommendations" field).

Wording of the Final Recommendations

To prevent bias in the way recommendations are worded, the American Academy of Orthopaedic Surgeons (AAOS) uses specific predetermined language stems that are governed by the evidence strengths. Each recommendation was written using language that accounts for the final strength of the recommendation. This language, and the corresponding strength, is shown in Table 9 in the original guideline document.

Voting on the Recommendations

The recommendations and their strength were voted on by the work group members during the final meeting. If disagreement between the work group occurred, there was further discussion to see whether the disagreement(s) could be resolved. Up to three rounds of voting were held to attempt to resolve disagreements. If disagreements were not resolved following three voting rounds, no recommendation was adopted. Lack of agreement is a reason that the strength for some recommendations can be labeled "Limited."

Rating Scheme for the Strength of the Recommendations

Strength of Recommendations Descriptions

Strength	Overall Strength of Evidence	Description of Evidence Strength	Strength Visual
Strong	Strong	Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.	****
Moderate	Moderate	Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.	***
Limited	Low Strength Evidence or Conflicting Evidence	Evidence from one or more "Low" strength studies with consistent findings or evidence from a single "Moderate" strength study for recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.	**
Consensus†	No Evidence	There is no supporting evidence. In the absence of reliable evidence, the work group is making a recommendation based on their clinical opinion. Consensus recommendations can only be created when not establishing a recommendation could have catastrophic consequences.	*

†Consensus based recommendations are made according to specific criteria. These criteria can be found in Appendix VI in the original guideline document.

Cost Analysis

The guideline developers reviewed published cost analyses.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Peer Review

Following the final meeting, the guideline draft undergoes peer review for additional input from external content experts. Written comments are provided on the structured review form (see Appendix VII in the original guideline document). All peer reviewers are required to disclose their conflicts of interest. To guide who participates, the work group identifies specialty societies at the introductory meeting. *Organizations*, not *individuals*, are specified.

The specialty societies are solicited for nominations of individual peer reviewers approximately six weeks before the final meeting. The peer review period is announced as it approaches and others interested are able to volunteer to review the draft. The chair of the American Academy of Orthopaedic Surgeons (AAOS) Committee on Evidence Based Quality and Value reviews the draft of the guideline prior to dissemination.

Some specialty societies (both orthopaedic and non-orthopaedic) ask their evidence-based practice (EBP) committee to provide review of the guideline. The organization is responsible for coordinating the distribution of our materials and consolidating their comments onto one form. The chair of the external EBP committees provides disclosure of their conflicts of interest (COI) and manages the potential conflicts of their members.

Again, the AAOS asks for comments to be assembled into a single response form by the specialty society and for the individual submitting the review to provide disclosure of potentially conflicting interests. The peer review stage gives external stakeholders an opportunity to provide evidence-based direction for modifications that they believe have been overlooked. Since the draft is subject to revisions until its approval by the AAOS Board of Directors as the final step in the guideline development process, confidentiality of all working drafts is essential.

The manager of the evidence-based medicine unit drafts the initial responses to comments that address methodology. These responses are then reviewed by the work group chair and vice-chair, who respond to questions concerning clinical practice and techniques. The director of the Department of Research and Scientific Affairs provides input as well. All comments received and the initial drafts of the responses are also reviewed by all members of the work group. All changes to a recommendation as a result of peer review are based on the evidence and undergoes majority vote by the work group members via teleconference. Final revisions are summarized in a detailed report that is made part of the guideline document throughout the remainder of the review and approval processes.

The AAOS believes in the importance of demonstrating responsiveness to input received during the peer review process and welcomes the critiques of external specialty societies. Following final approval of the guideline, all individual responses are posted on the AAOS Web site with a point-by-point reply to each non-editorial comment. Reviewers who wish to remain anonymous notify the AAOS to have their names de-identified; their comments, AAOS responses, and their COI disclosures are still posted.

Review of the Management of Hip fractures in the Elderly guideline was requested of 31 organizations and 23 external content experts were nominated to represent them. Ten individuals returned comments on the structured review form (see Appendix IX in the original guideline document).

Public Commentary

After modifying the draft in response to peer review, the guideline was subjected to a thirty day period of "Public Commentary." Commentators consist of members of the AAOS Board of Directors (BOD), members of the Council on Research and Quality (CORQ), members of the Board of Councilors (BOC), and members of the Board of Specialty Societies (BOS). The guideline is automatically forwarded to the AAOS BOD and CORQ so that they may review it and provide comment prior to being asked to approve the document. Members of the BOC and BOS are solicited for interest. If they request to see the document, it is forwarded to them for comment. Based on these bodies, over 200 commentators have the opportunity to provide input into this guideline. Three members returned public comments.

AAOS Guideline Approval Process

This final guideline draft must be approved by the AAOS Committee on Evidence-Based Quality and Value, the AAOS Council on Research and Quality, and the AAOS Board of Directors. These decision-making bodies are described in Appendix II in the original guideline document and are not designated to modify the contents. Their charge is to approve or reject its publication by majority vote.

The guideline was adopted by the American Academy of Orthopaedic Surgeons Board of Directors on September 5, 2014.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is specifically stated for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Operative treatment of stable (non-displaced) femoral neck fractures typically provides reproducible results with low risk, earlier mobilization and fewer complications compared with nonoperative treatment.
- The benefit of total hip arthroplasty for patients with unstable (displaced) femoral neck fractures will be the avoidance of reoperations in this frail patient population. This has implications on cost savings to society.
- Most studies showed that hip fracture surgery within 48 hours of admission improved outcomes in regards to mortality, pain, complications, and length of stay.
- The benefit of not delaying hip fracture surgery for patients on aspirin and/or clopidogrel is preventing an unnecessary (unhelpful) delay.
- Evaluation of comparative studies shows an apparent treatment benefit with cephalomedullary devices for unstable peritrochanteric fractures. A moderate strength study demonstrated a lower complication rate with use of a cephalomedullary versus an extramedullary device in treatment of unstable intertrochanteric and subtrochanteric fractures. Another moderate strength study showed improved mobility and decreased limb shortening in unstable intertrochanteric fractures treated with a cephalomedullary device versus a sliding hip screw.
- Occupational and physical therapy across the continuum of care, including home, improves functional outcomes and fall prevention.
- Studies evaluated the benefits of intensive exercise training in elderly patients with hip fracture. These studies support that intensive exercise training administered by physical therapy to patients after discharge from hospital care, improves functional outcomes, leg strength and health status.
- Four moderate strength studies showed benefits of either supplemental calcium, vitamin D or both to reduce fall risk and prevent fractures in the elderly.

Potential Harms

Most treatments are associated with some known risks, especially invasive and operative treatments. Contraindications vary widely based on the treatment administered. A particular concern when managing hip fractures in the elderly is the potential for the overall fracture treatment to result in increased patient mortality or decreased level of mobility and independence (compared to status prior to hip fracture). Additional factors may affect the physician's choice of treatment including, but not limited to: associated injuries the patient may present with, as well as the individual's co-morbidities, and/or specific patient characteristics including low bone mass and osteoarthritis.

Potential Harms of Specific Interventions

- Risks of preoperative regional analgesia are equal to those of any regional anesthesia technique.
- Not delaying hip fracture surgery in patients on antiplatelet (clopidogrel and/or aspirin) therapy: As with all surgical procedures, there are potential risks and complications, including, but not limited to, the possibility of bleeding. There is no data suggesting patient outcome harms will occur with implementation of this recommendation.
- Both general anesthesia and spinal anesthesia carry risks and benefits, which should be assessed on an individual basis. Because both forms of anesthesia appear to have similar mortality profiles, providers can consider specific circumstances that would favor one form or the other for their particular patient.
- Operative fixation for patients with stable (non-displaced) femoral neck fractures: Higher morbidity, mortality, and longer hospital stays have been shown to be associated with non-operative treatment. The benefit of avoiding surgery and anesthesia was contrasted with a failure rate of approximately 20% in the non-operative treatment group that required surgery.
- The harms associated with venous thromboembolism (VTE) prophylaxis include bleeding and thrombotic complications.
- There is risk that cognitively impaired patients cannot report symptoms, so special attention to these individuals may be warranted when considering blood transfusion.
- Postoperative multimodal analgesia: Potential risks include medication risks and those associated with the particular procedures or techniques.
- Calcium and vitamin D supplements are generally safe with few side effects. Some studies show that supplemental calcium in adults aged 65 or older is associated with an increased risk of constipation or nephrolithiasis.

- Osteoporosis evaluation and treatment: There is the potential for "atypical femur fractures" that may be associated with prolonged bisphosphonate therapy. All medications including osteoporosis therapies have potential harms.

Qualifying Statements

Qualifying Statements

- This Clinical Practice Guideline was developed by an American Academy of Orthopaedic Surgeons (AAOS) clinician volunteer Work Group based on a systematic review of the current scientific and clinical information and accepted approaches to treatment and/or diagnosis. This Clinical Practice Guideline is not intended to be a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. Clinical patients may not necessarily be the same as those found in a clinical trial. Patient care and treatment should always be based on a clinician's independent medical judgment, given the individual patient's clinical circumstances.
- The summary of recommendations is not intended to stand alone. Treatment decisions should be made in light of all circumstances presented by the patient. Treatments and procedures applicable to the individual patient rely on mutual communication between patient guardian, physician, and other healthcare practitioners.
- Some drugs or medical devices referenced or described in this Clinical Practice Guideline may not have been cleared by the U.S. Food and Drug Administration (FDA) or may have been cleared for a specific use only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or device he or she wishes to use in clinical practice.
- Musculoskeletal care is provided in many different settings by many different providers. The AAOS created this guideline as an educational tool to guide qualified physicians through a series of treatment decisions in an effort to improve the quality and efficiency of care. This guideline should not be construed as including all proper methods of care or excluding methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific procedure or treatment must be made in light of all circumstances presented by the patient and the needs and resources particular to the locality or institution.
- Clinician input based on experience increases the probability of identifying patients who will benefit from specific treatment options. The individual patient and/or their decision surrogate dynamic will also influence treatment decisions, therefore, discussion of available treatments and procedures applicable to the individual patient rely on mutual communication between the patient and/or decision surrogate and physician, weighing the potential risks and benefits for that patient. Once the patient and/or their decision surrogate have been informed of available therapies and have discussed these options with the patient's physician, an informed decision can be made.

Implementation of the Guideline

Description of Implementation Strategy

Guideline Dissemination Plans

The primary purpose of the guideline is to provide interested readers with full documentation about not only the work group's recommendations, but also about how the group arrived at those recommendations. This document is also posted on the American Academy of Orthopaedic Surgeons (AAOS) website .

Shorter versions of the guideline are available in other venues. Publication of most guidelines is announced by an Academy press release, articles authored by the work group and published in the Journal of the American Academy of Orthopaedic Surgeons, and articles published in AAOS *Now*. Most guidelines are also distributed at the AAOS Annual Meeting in various venues such as on Academy Row and at Committee Scientific Exhibits.

Selected guidelines are disseminated by webinar, an Online Module for the Orthopaedic Knowledge Online website, Radio Media Tours, Media Briefings, and by distributing them at relevant Continuing Medical Education (CME) courses and at the AAOS Resource Center.

Other dissemination efforts outside of the AAOS will include submitting the guideline to the National Guideline Clearinghouse (NGC) and distributing the guideline at other medical specialty societies' meetings.

Implementation Tools

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

American Academy of Orthopaedic Surgeons (AAOS). American Academy of Orthopaedic Surgeons clinical practice guideline on management of hip fractures in the elderly. Rosemont (IL): American Academy of Orthopaedic Surgeons (AAOS); 2014 Sep 5. 521 p. [186 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

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Guideline Developer(s)

American Academy of Orthopaedic Surgeons - Medical Specialty Society

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Financial Disclosures/Conflicts of Interest

In accordance with American Academy of Orthopaedic Surgeons (AAOS) policy, all individuals whose names appear as authors or contributors to Clinical Practice Guideline filed a disclosure statement as part of the submission process. All panel members provided full disclosure of potential conflicts of interest prior to voting on the recommendations contained within this Clinical Practice Guidelines. See Appendix XI in the original guideline document for individual work group members' conflicts of interest.

Guideline Endorser(s)

American Academy of Physical Medicine and Rehabilitation - Medical Specialty Society

American Association of Clinical Endocrinologists - Medical Specialty Society

American Geriatrics Society - Medical Specialty Society

Orthopaedic Rehabilitation Association - Medical Specialty Society

Orthopaedic Trauma Association - Medical Specialty Society

The Hip Society - Professional Association

United States Bone and Joint Initiative - Professional Association

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Electronic copies: Available from American Academy of Orthopaedic Surgeons Web site .

Print copies: Available from the American Academy of Orthopaedic Surgeons, 9400 West Higgins Road, Rosemont, IL 60018-4262. Telephone: (800) 626-6726 (800 346-AAOS); Fax: (847) 823-8125; Web site: www.aaos.org .

Availability of Companion Documents

The following is available:

- Management of hip fractures in the elderly. Summary of recommendations. Rosemont (IL): American Academy of Orthopaedic Surgeons; 2014. 17 p. Electronic copies: Available from the American Academy of Orthopaedic Surgeons Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on October 21, 2014. The information was verified by the guideline developer on November 14, 2014.

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